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- a. coating paramagnetic particles or beads with a first antibody or antibody fragment directed against a second antibody or antibody fragment;
  - b. incubating the second antibody or antibody fragment with the cell suspension to bind the second antibody or antibody fragment with the target cell, thereby creating a cell mixture, wherein the second antibody or antibody fragment is directed against a membrane structure specifically expressed on the target cell and not on a non-target cell in the cell mixture;
  - c. washing the cell mixture to remove unbound second antibody or antibody fragment;
  - d. mixing the coated paramagnetic particles or beads with the washed cell mixture;
  - e. incubating the washed cell mixture and the coated paramagnetic particles under gentle rotation at about 4°C until target cell-bead rosettes are formed; and
  - f. visually detecting the target cell-bead rosettes after incubation.
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39. (Twice Amended) The method of claim 22, wherein the second antibody or antibody fragment is directed against fibronectin receptor,  $\beta$ -integrin, vitronectin receptor,  $\alpha\gamma\beta 3$ -integrin, P-selectin including GMP-140, CD44-variants, N-CAM including CD-56, E-cadherin, Le<sup>x</sup>, carcinoembryonic antigen or CEA, EGF receptor, c-erbB-2 including HER2, transferin receptor, TNF-receptor, high molecular weight antigen, p95-100, sarcoma antigens including TP-1 and TP-3 epitope, Mv 200kD, Mv160kD, MOC-31 epitope including cluster 2 epithelial antigen, MUC-1 antigen including DF3-epitope and gp290kD, prostate high molecular antigen, TAG 72, bladder carcinoma antigen, Mv 48kD colorectal carcinoma antigen, lung carcinoma antigen Mv 350-420kD, Mel-14 epitope,  $\beta_2$ -microglobulin, Apo-1 epitope, or pan-human cell antigen.

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46. (Four Times Amended) A kit for performing the method of claim 22, the kit comprising:

- a. a first antibody, wherein said first antibody is a specific monoclonal antibody or antibody fragment directed against a second antibody or

antibody fragment, said first antibody effective for coating a paramagnetic particle or bead without removing its antigen-binding ability;

b. a paramagnetic particle or bead; and

73 c. the second antibody, wherein said second antibody is a specific monoclonal antibody or antibody fragment directed against an antigen or a receptor within or on the target cell;

wherein said second antibody or antibody fragment is conjugated to a detectable label.

74 59. (Twice Amended) The method of claim 22, wherein the second antibody or antibody fragment directed against a membrane structure specifically expressed on the target cell is a murine or a human antibody or fragment thereof.

75 62. (Four Times Amended) The method of claim 22, wherein the method further comprises after incubating, applying a magnetic field to separate out the target cell-bead rosettes.

76 64. (Twice Amended) The method of claim 22, wherein visually detecting includes counting the target cell-bead rosettes using a microscope or a cell or particle counting device.

77 80. (Amended) The method according to claim 22 further comprising after incubating; detecting a second antigen of the target cell by adding a second labeled monoclonal antibody directed to the second antigen to the cell suspension; and quantitating the amount of labeled second monoclonal antibody bound to the rosettes.

78 83. (Amended) The method according to claim 22, further comprising before mixing; prelabeling the target cells with a labeled second monoclonal antibody to second antigen on the target cell; and after incubating, quantitating the amount labeled second monoclonal antibody bound to the rosettes.

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84. (Amended) The method according to claim 22, further comprising after incubating, applying a magnetic field to separate out the target cell bead rosettes; and detecting target cells specific genes at the DNA, mRNA or protein level.

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87. (Three Times Amended) A method for detecting living tumor cells in a cell suspension of mixed cell population or in a cell suspension prepared from a solid tissue, at a sensitivity of one target cell per 100 or more total cells, with the exception of normal and malignant hematopoietic cells in blood and bone marrow, comprising:

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- a) coating paramagnetic particles with a first antibody or fragment directed against a second tumor-specific monoclonal antibody or fragment;
  - b) incubating the second tumor specific antibody or antibody fragment with the cell suspension to allow the second tumor specific antibody or antibody fragment to bind the tumor cells;
  - c) washing the cell suspension to remove unbound second antibody or antibody fragment;
  - d) mixing the coated paramagnetic particles with the cell suspension;
  - e) incubating the mixture at about 4°C under gentle rotation until tumor cell-bead rosettes are formed; and
  - f) visually detecting the tumor cell-bead rosettes.
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88. (Amended) The method according to claim 87 further comprising after incubating; applying a magnetic field to the mixture to separate out the tumor cell-bead rosettes.

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89. (Amended) The method according to claim 87, wherein the tumor-specific monoclonal antibody is specific for tumor antigens comprising a growth factor receptor, an oncogene product expressed on the membrane of a malignant cell, an adhesion membrane molecule, an MDR protein, breast, ovarian or lung carcinoma cells; melanoma, sarcoma, glioblastoma or cancer cells of the gastrointestinal tract; melanoma, sarcoma, glioblastoma or cancer cells of the genitourinary tract; or melanoma, sarcoma, glioblastoma or cancer cells of the reticuloendothelial system.

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91. (Amended) The method according to claim 87 further comprising, after incubating; detecting a second antigen on the tumor cell by adding a labeled second monoclonal antibody specific for the second antigen to the cell suspension; and quantitating the amount of labeled second monoclonal antibody bound to the tumor cell-bead rosettes.

96. (Amended) The method according to claim 87, wherein the mixture is incubated for about 30 minutes.

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97. (Amended) The method according to claim 91, wherein the tumor cell-bead rosettes are quantitated by counting them using a microscope or a cell or particle counting device.

98. (Amended) The method according to claim 91 further comprising after quantitating; culturing the tumor cell-bead rosettes in a growth medium until a cell culture is established.

100. (Amended) The method according to claim 97, wherein the labeled third monoclonal antibody is labeled with fluoresceine, a radioactive compound, biotin or an enzyme.

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101. (Amended) The method according to claim 22, further comprising after incubating; applying a magnetic field to the mixture to separate out the target cell-bead rosettes; and detecting target cell specific genes.

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104. (Amended) The method according to claim 22 further comprising, after step (e); applying a magnetic field to the mixture to separate out target cell-bead rosettes; and culturing the target cell-bead rosettes in a growth medium to establish a cell culture.

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117. (Amended) A kit for performing the method of claim 22, the kit comprising:

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- a. a first antibody, wherein said first antibody is a specific monoclonal antibody or antibody fragment directed against a second antibody or antibody fragment, said first antibody effective for coating a paramagnetic particle or bead without removing its antigen-binding ability;
- b. a paramagnetic particle or bead; and
- c. the second antibody, wherein said second antibody is a specific monoclonal antibody or antibody fragment directed against an antigen or a receptor within or on the target cell, wherein the second antibody or antibody fragment is directed against fibronectin receptor,  $\beta$ -integrin, vitronectin receptor,  $\alpha\gamma\beta 3$ -integrin, P-selectin including GMP-140, CD44-variants, N-CAM including CD-56, E-cadherin, Le<sup>x</sup>, carcinoembryonic antigen or CEA, EGF receptor, c-erbB-2 including HER2, transferin receptor, TNF-receptor, high molecular weight antigen, p95-100, sarcoma antigens including TP-1 and TP-3 epitope, Mv 200kD, Mv160kD, MOC-31 epitope including cluster 2 epithelial antigen, MUC-1 antigen including DF3-epitope and gp290kD, prostate high molecular antigen, TAG 72, bladder carcinoma antigen, Mv 48kD colorectal carcinoma antigen, lung carcinoma antigen Mv 350-420kD, Mel-14 epitope,  $\beta_2$ -microglobulin, Apo-1 epitope, or pan-human cell antigen;
- wherein said second antibody or antibody fragment is conjugated to a detectable label.